

# Superior Mesenteric Artery Syndrome After Roux-en-Y Gastric Bypass

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## ABSTRACT

**Background and Objectives:** As bariatric surgery becomes more widespread, atypical complications will be seen with more frequency. In this case series, we report on 3 cases of superior mesenteric artery syndrome after gastric bypass and the laparoscopic treatment.

**Methods:** This is a case series of 3 patients who presented with the persistent postprandial symptoms of pain and nausea after gastric bypass, and through an extensive workup were eventually diagnosed with superior mesenteric artery syndrome. All 3 patients had dramatic weight loss after laparoscopic Roux-en-y gastric bypasses. Gastric remnant distention was not a consistent finding, but persistent postprandial nausea, epigastric pain, and computed tomographic findings of a narrowed angle between the superior mesenteric artery and the aorta were consistently found. Two patients were treated with a laparoscopic gastroduodenal jejunostomy anastomosis, and one patient had a duodenojejunostomy, all with resolution of their symptoms.

**Results:** A laparoscopic gastroduodenal (or duodeno-) jejunal bypass was performed in each case, which resolved the obstruction caused by the superior mesenteric artery syndrome.

**Conclusions:** Superior mesenteric artery syndrome can be caused by the dramatic weight loss induced by a gastric bypass. This post weight loss surgery phenomenon may be far more prevalent and underdiagnosed than reported, and should be considered in all patients with greater than average weight loss at one year and who have persistent postprandial nausea and epigastric pain. This can be successfully treated by bypassing the obstruction, while maintaining the weight loss induced by the Roux-en-y gastric bypass.

**Key Words:** Superior mesenteric artery syndrome, Bariatric surgery.

## INTRODUCTION

Morbid obesity has reached epidemic proportions in the United States and is increasing throughout the rest of the world. Although only a small fraction of patients eligible for bariatric surgery ever undergo it, around 200,000 gastric bypass procedures are being performed yearly in the United States. As the laparoscopic Roux-en-y gastric bypass (RNYGB) becomes more common and more are performed, rare complications will occur more frequently. We report on a case series of 3 patients who experienced superior mesenteric artery (SMA) syndrome after undergoing laparoscopic RNYGB.

## CASE ONE

The first patient was a 28-year-old female with a body mass index (BMI) of 41 who underwent laparoscopic RNYGB for morbid obesity. Her comorbidities included obstructive sleep apnea and fibromyalgia. Initially, her postoperative course was unremarkable, and she had excellent weight loss. Four months later, her BMI had decreased to 32. After 6 months she developed intense epigastric pain. Upper endoscopy and ultrasound were negative, but she had a decreased gallbladder ejection fraction on a hepatobiliary scan and underwent laparoscopic cholecystectomy. The gastric bypass was intact, and no internal hernias were identified at the time of surgery.

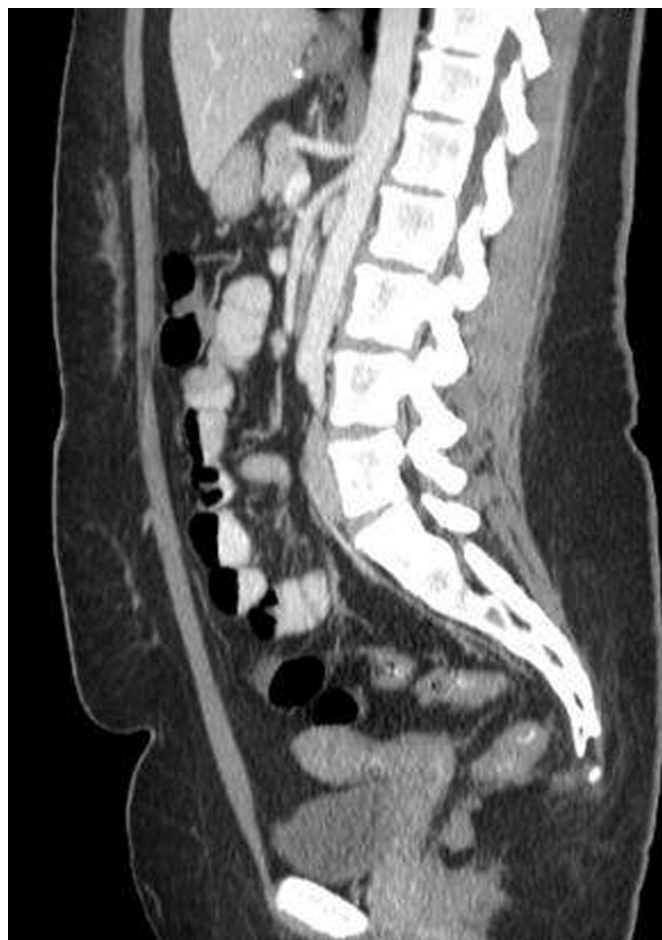
Her pain resolved initially, but her weight dropped at a much greater than average rate. Over the course of several more months, the patient developed vague abdominal pains mostly concentrating on the left side of the abdomen. By 9 months postoperatively, her BMI was 25. At 10 months, the patient developed severe recurrent epigastric pain and significant postprandial nausea and intolerance for all foods. She underwent repeat upper endoscopy that was negative. A computed tomographic (CT) scan of the abdomen was normal except for abnormal narrowing of the SMA-Aorta distance to 6mm (**Figure 1**). We felt at this point that with a current BMI of 22 she had developed SMA syndrome. A diagnostic laparoscopy with gastroduodenojejunostomy through the pylorus was performed, using the common channel of the jejunum. A gastrostomy tube was also placed. Postoperatively, the patient's post-

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**Figure 1.** Computed tomographic scan showing the distance from the superior mesenteric artery to the aorta measuring 6 mm.

prandial nausea and pain resolved. Subsequently, her weight has increased and stabilized with a BMI of 24 at 1-year follow-up.

## CASE TWO

A 44-year-old female underwent routine laparoscopic RNYGB with an initial BMI of 41 and associated comorbidities of diabetes mellitus, diabetic gastroparesis, and gastroesophageal reflux disease. She initially had greater than usual and prolonged postoperative nausea that did eventually resolve with the use of Doxepin. Her weight loss was much greater than average, at 6 months postop her BMI was 26, and she complained of constipation and some abdominal pain. After 11 months, her BMI was 22, with an excess body weight loss of 100%. At this time, the patient developed persistent and refractory symptoms of postprandial nausea and emesis. These symptoms led to



**Figure 2.** Computed tomographic scan again showing narrowed distance between the superior mesenteric artery and aorta.

an extensive workup including a CT scan of the abdomen, ultrasound, and hepatobiliary scan, which were all unremarkable. A diagnostic laparoscopy with enterolysis and laparoscopic cholecystectomy was performed. At that time, a fluid-filled distal stomach remnant was identified indicating possible partial duodenal obstruction. A gastrostomy tube was placed at this operation.

Upon retrospective review of the CT scan, a narrowing of the SMA/aorta angle was noted (**Figure 2**). SMA syndrome could not be confirmed by placing contrast through her gastrostomy tube to evaluate the distal stomach and the duodenum, because the contrast went freely through the third and fourth portions of the duodenum. The patient continued to have symptoms, so we proceeded to perform a laparoscopic gastroduodenojejunostomy, again through the pylorus, using the common channel of the jejunum. Postoperatively, all of her symptoms of nausea and emesis completely resolved. At the time of surgery, her BMI had reached a low of 21. At 2 years of follow-up, her BMI was stable at 23.

## CASE THREE

A 37-year-old female with a BMI of 45 underwent a laparoscopic RNYGB. Her postoperative course was compli-

cated by postprandial hypoglycemia. At 1-year postop, her BMI was 26. Thirteen months postop, the patient had laparoscopic cholecystectomy for right upper quadrant pain and biliary dyskinesia. Two years later, the patient had a BMI of 23 and had 81% excess body weight loss, but had persistent pain in her right upper quadrant and nausea. We suspected SMA syndrome. Therefore, a laparoscopic lysis of the ligament of Treitz and gastrostomy tube placement was performed. Her pain relief was short-lived at 2 weeks. Multiple radiology studies were undertaken including contrast studies of distal stomach remnant and duodenum. A vascular indentation of the duodenum at the level of the third portion of the duodenum was recognized. It was felt that lysis of the ligament of Treitz had failed, and therefore an open duodenojejunostomy, using the common channel of the jejunum was performed. Resolution of the patient's pain was slow but progressive, and as of 3 years after surgery her BMI was stable at 25, and the abdominal pain and nausea had resolved.

## DISCUSSION

Morbid obesity has reached epidemic proportions in the United States. Approximately 200 000 bariatric surgeries are performed annually, but this still only scratches the surface. As laparoscopic RNYGB becomes more common and widespread, rare complications will be seen with greater frequency. SMA syndrome is one of these complications, as our case series demonstrates. The prevalence in our series of gastric bypass patients is 0.17%, similar to the published prevalence of 0.6%.<sup>1</sup>

SMA syndrome was originally described by Von Rokitsky in 1842.<sup>2</sup> In the past, it has been seen primarily in patients with dramatic weight loss, usually secondary to a physiologic stressor. These included patients who had burns, starvation, scoliosis, immobilization in body casts, and anorexia nervosa. Rapid weight loss after RNYGB can now be added to that list.<sup>3</sup> The symptoms include epigastric pain, exacerbated by eating, and nausea. The signs are a dilated distal stomach, a compressed third portion of the duodenum, and a decrease in the angle of the takeoff of the SMA from the aorta. The normal aortomesenteric angle is 25 degrees to 60 degrees, and the normal distance of the aorta to the SMA across the third portion of the duodenum is 10mm to 28mm. A decrease in the diameter of the duodenum of less than 8mm or a decrease of the angle from 6 degrees to 15 degrees is indicative of SMA syndrome.<sup>4</sup> Upper GI series and plain radiographs usually do not provide the diagnosis. They may show a dilated distal stomach or dilation of the first and second part of the

duodenum. However, multi-slice CT scans allow for multiple views and precise measurements of the gastrointestinal tract. Abou-Nutka et al<sup>1</sup> suggest that an aortomesenteric distance <8mm confirms the diagnosis.

Currently, most cases of SMA syndrome will be related to greater than expected weight loss from RNYGB. There is usually an excess body weight loss of 100% or greater. The usual presentation is nausea and epigastric pain. These are among the most common postoperative complaints, and persistence of these symptoms should prompt a workup. This evaluation should include an upper GI series, an upper endoscopy, and often a CT scan. The upper GI will not be helpful in diagnosing SMA syndrome unless performed through a gastrostomy tube in the distal stomach. In the past, patients often had to undergo a UGI series, treatment with parenteral nutrition, and even diagnostic laparoscopy with gastrostomy tube placement. A simple CT scan can make the diagnosis today, leading almost immediately to the correct diagnosis and treatment.

The treatment is surgical in almost all cases. There are multiple approaches including lysis of the ligament of Treitz, gastrostomy tube placement, or a proximal bypass of the common channel to the distal stomach or duodenum (ie, duodenojejunostomy, gastrojejunostomy, or a combination of both).<sup>2,5,6</sup> Once the third portion of the duodenum is bypassed, the symptoms resolve quickly.

Although this is only a case series of 3 patients, with an incidence of 0.6%, large series of these patients will be very difficult to accrue. This case series is obviously retrospective and observational, but can be useful by alerting the laparoscopic and bariatric community to this rare but serious complication.

## CONCLUSION

Superior mesenteric artery syndrome can be caused by the dramatic weight loss induced by a gastric bypass. This post weight loss surgery phenomenon may be far more prevalent and underdiagnosed than reported, and should be considered in all patients with greater than average weight loss at one year and who have persistent postprandial nausea and epigastric pain. This can be successfully treated by bypassing the obstruction, while maintaining the weight loss induced by the Roux-en-y gastric bypass.

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